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Remarks on Chara gymnopus A. Br., with Descriptions of new Species of Chara and Nitella.

BY T. F. ALLEN.

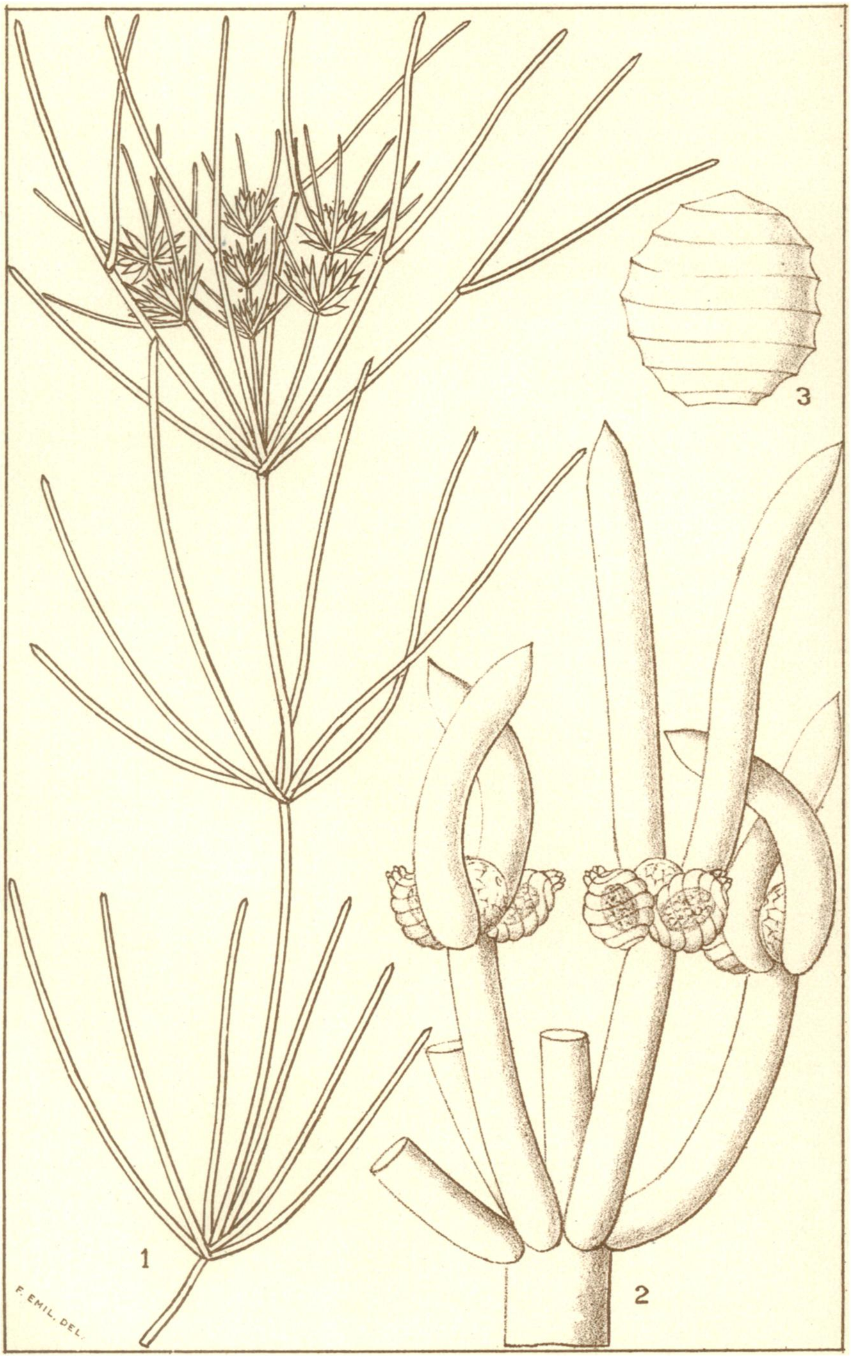
[PLATES 185–192.]

The species *Chara gymnopus* A. Br., was proposed in manuscript, by the late Al. Braun, and fully described in his Characeæ of Africa in 1847. Remarking upon the name in the latter work, Braun says: "So long as but few forms were known to me, it seemed easy to separate them into a series of related species, but since 16 to 18 forms have come to my notice I am doubtful whether it would not be more correct to collect them all except the diœcious *Ch. Martiana* and the disjoined monœcious *Ch. sejuncta*, as varieties under one species, for which the name *gymnopus*, though not the oldest, seems most appropriate;" also in a foot-note to this paragraph. "A part of the forms belonging here have formerly been described by me under the name *Ch. polyphylla*, 1858." The oldest name is *Ch. Ceylonica* Klein and Willd., but in accordance with the observations above, this name must be used to designate the most distinguished East Indian species.

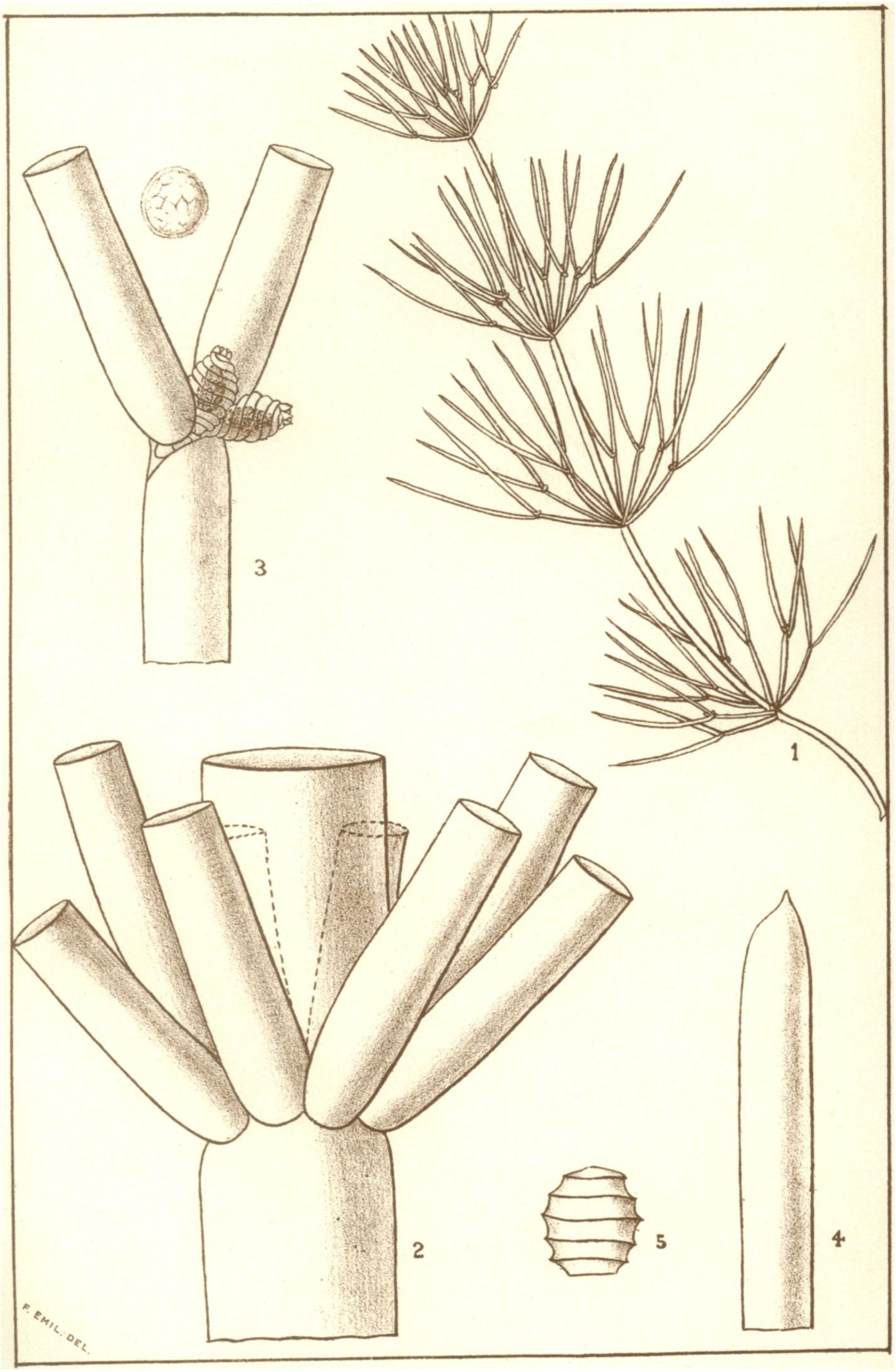
It seems to me unnecessary to make any changes in this name, to accord with the universally recognized rules of priority, for the species must in my view be abandoned entirely, and the several varieties be raised to the rank of species, with their appropriate names. Many species, hitherto called varieties, abound in America, and ample opportunity is afforded for continuous observation.

It is, to me, quite evident that these so-called varieties are fully distinct as species, not subject to any greater variability than other species of the genus, indeed their characters are wonderfully constant in identical localities, and furthermore the name *gymnopus* is required to designate a sub-section of the "*triplostichæ corticatæ*," division of *Chara*, namely:

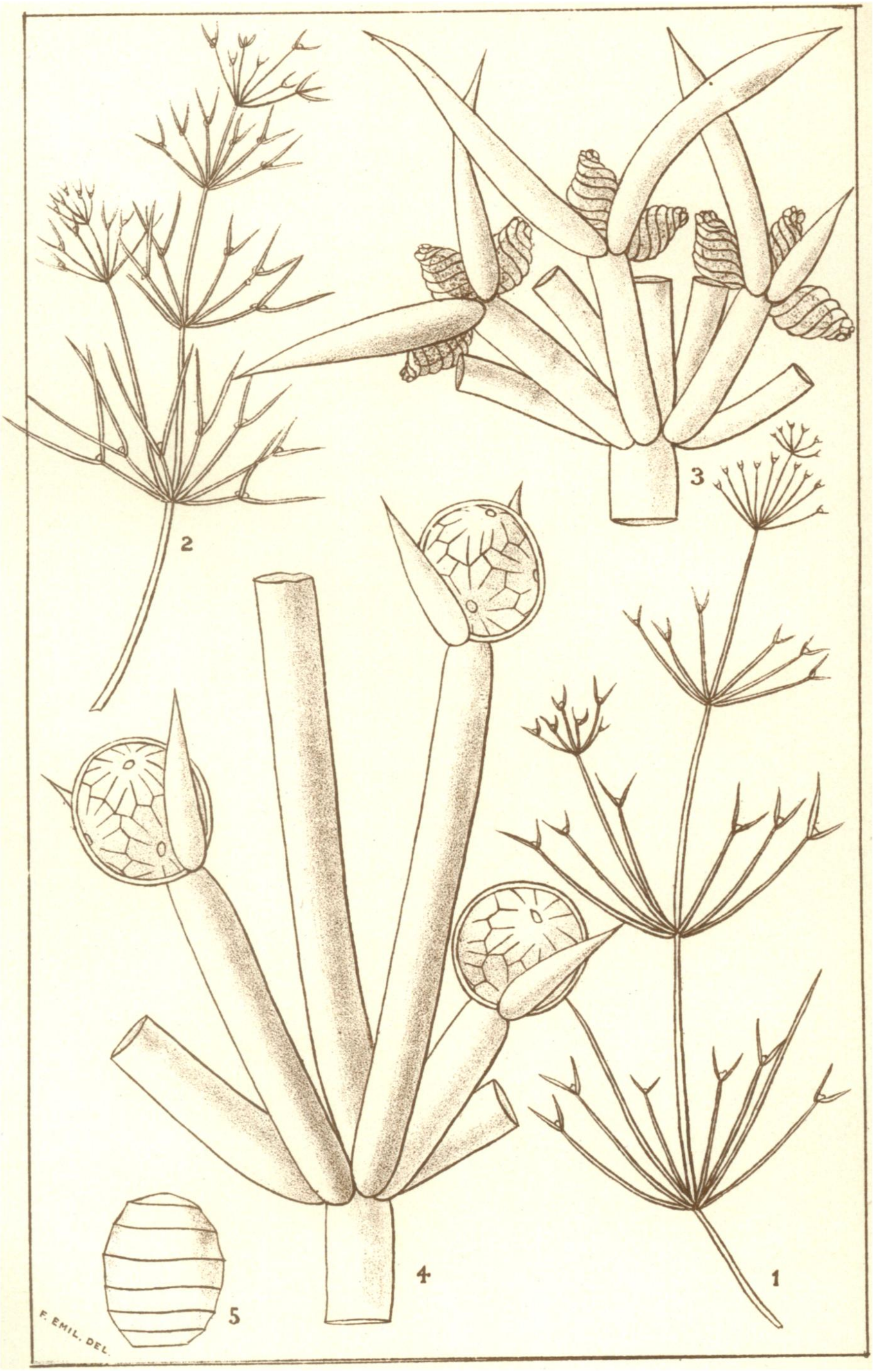
GYMNOPODÆ; *stem and leaves triply corticated; the lowest segment of the leaves naked.* Under this section I am able to place the following new species, giving a later revision of the names of



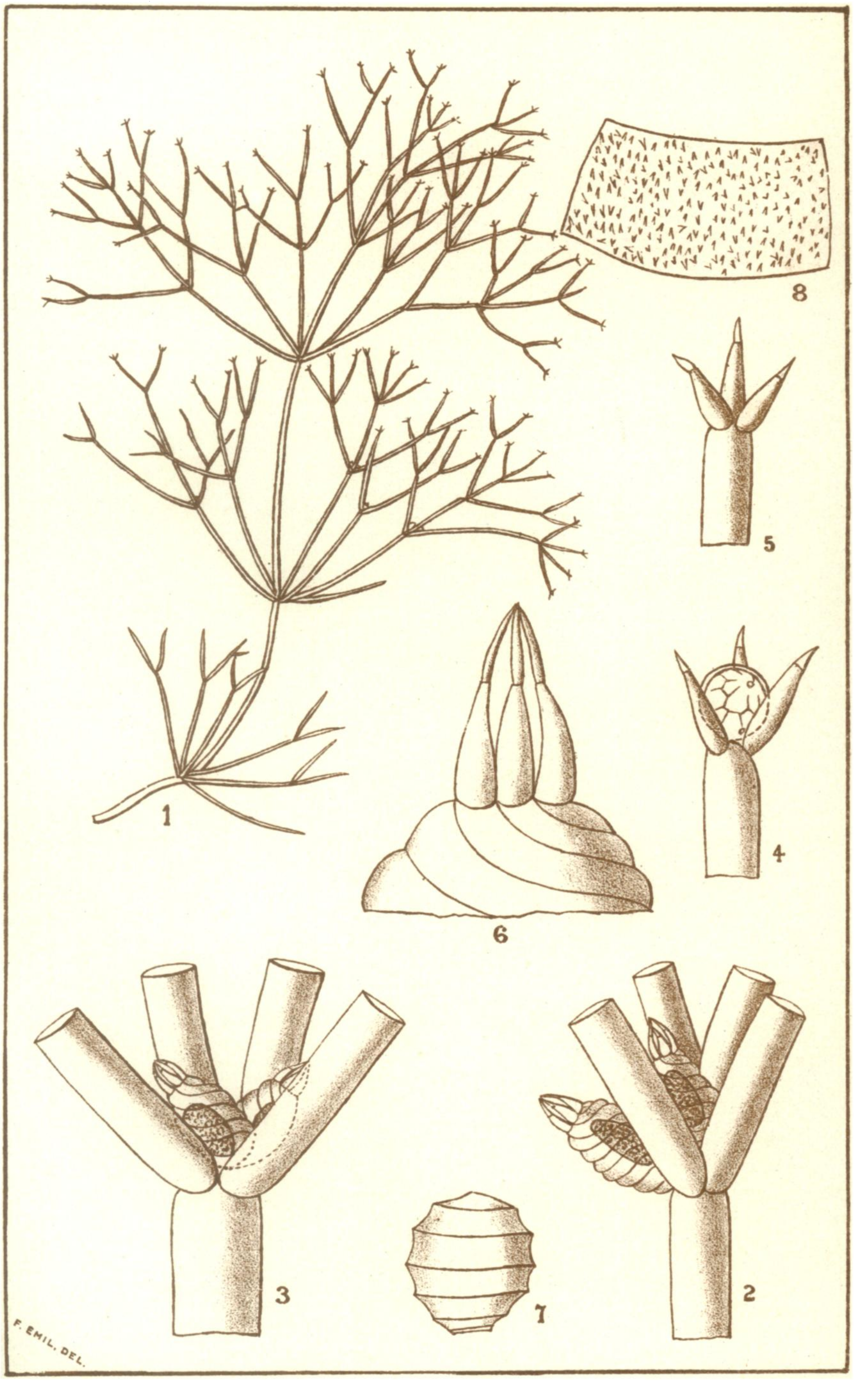
Nitella Californica, Allen.



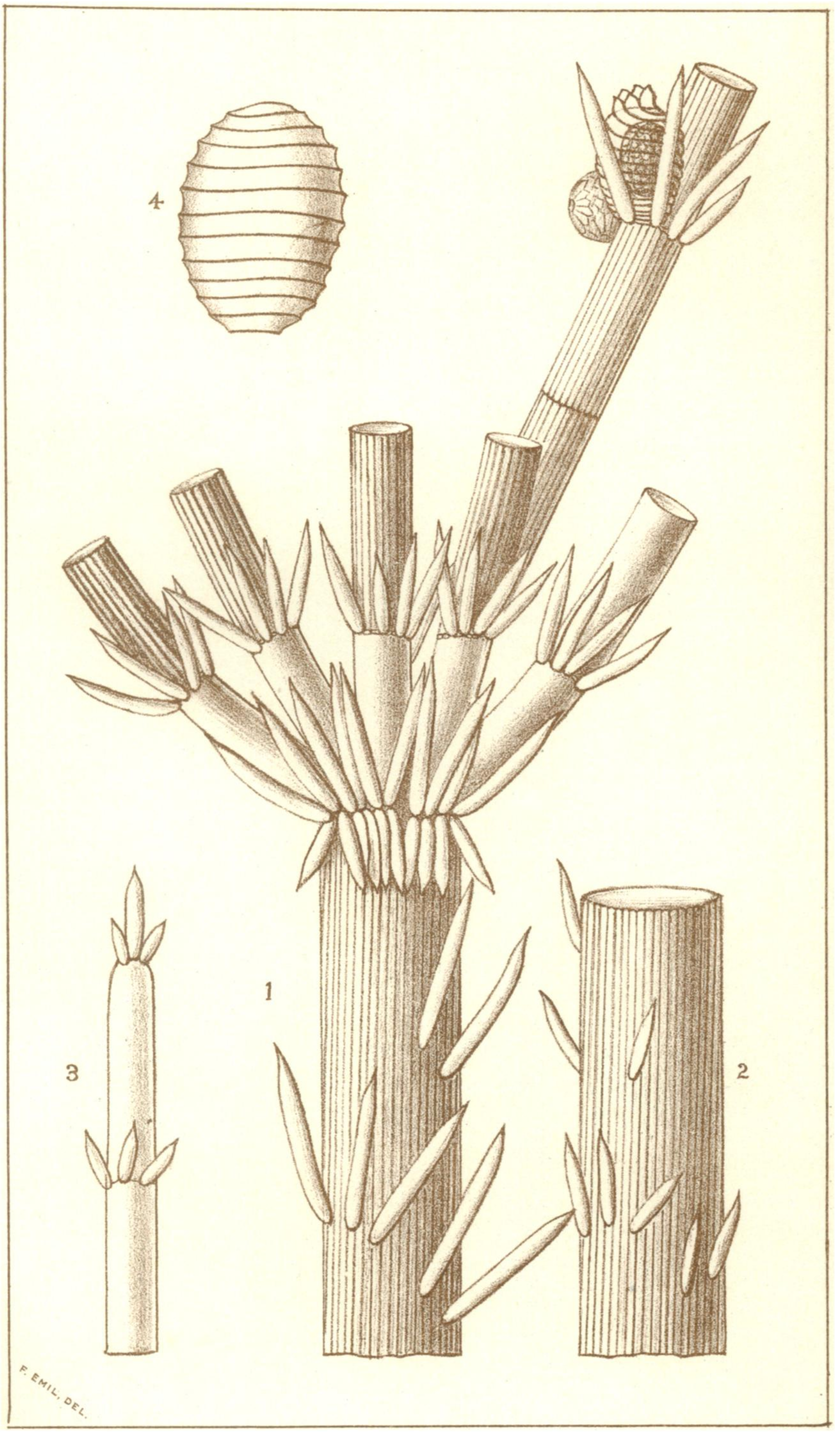
Nitella Mexicana, Allen.



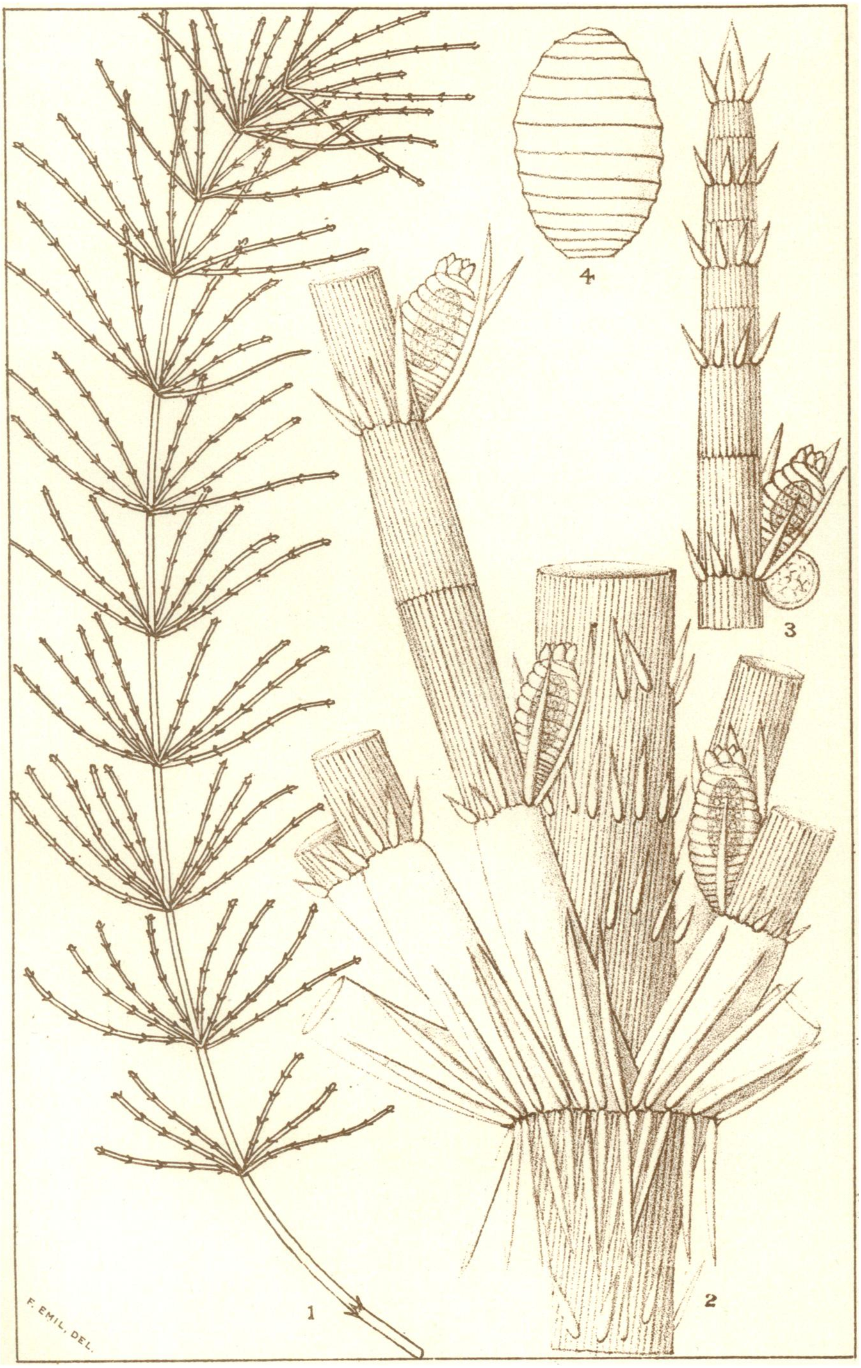
Nitella occidentalis, Allen.



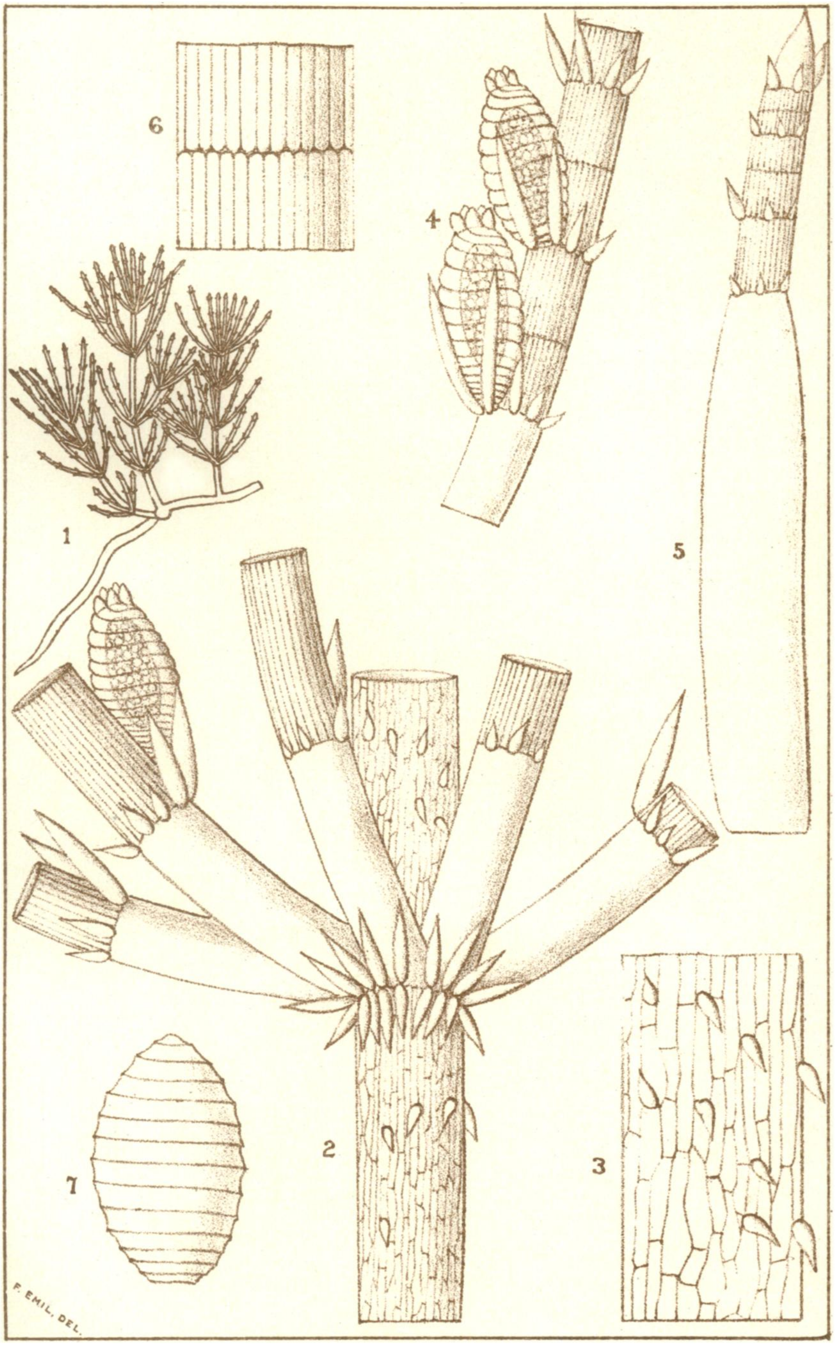
Nitella Japonica, Allen.



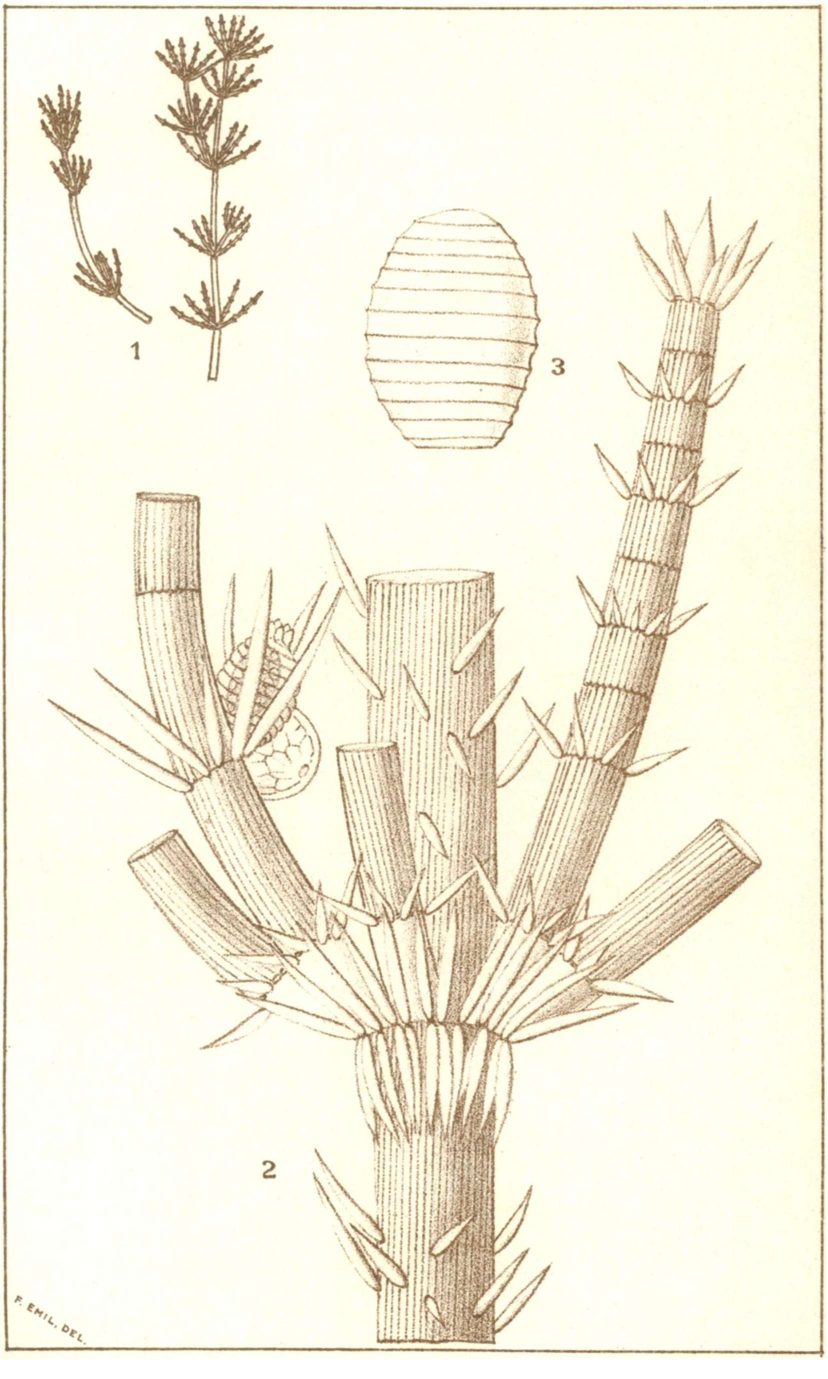
Chara Cubensis, Allen.



Chara Carmenensis, Allen.



Chara Hicksii, Allen.



Chara depauperata, Allen.

all the species. The dimensions given in this paper are expressed in thousandths of a millimetre (mikrons).

CHARA CUBENSIS sp. nov.

Chara diplostephana, triplosticha, gymnopus, monoica-conjuncta, podosteira.

Stems 40–50 cm. in length, armed with scattered linear spines of variable length, from one-half the diameter of stems in length, to longer than the diameter (.360–.850 mm.); diameter of stem about .780 mm. The leaves usually rather shorter than the internodes in mature plants.

Stipules nearly equal or exceed the length of the lowest leaf-segment, upper, about .850 long; lower .610 long.

Leaves consist of 6–7 segments, of which the first is naked, .900–.975 long, .550 in diameter (varies to 1.098 long, .340 in diameter); first node usually sterile, *sometimes fertile ;* second segment usually corticated, 2.500 long, .500 in diameter; third segment, 2.200 long; fourth, 6.500 long, .600 in diameter, usually naked; fifth and sixth (terminal) naked, *at times the whole leaf naked.*

Bracts verticillate, anterior usually exceed the length of the sporophydia, posterior slightly shorter; lateral bracts longer than anterior (anterior .700 long, lateral 1.100, posterior .700), sporophydium .610 long, coronula spreading, .120 high, .220 in diameter. Nucleus .600 long, .400 broad (.585 by .425) with 12 or 13 ridges. Antheridium .360 in diameter. In older specimens the leaves frequently have 7–8 nodes, in some specimens all the leaves are naked.

This species is founded upon a few specimens, now known only in the herbarium of the Missouri Botanical Garden, collected by "Wright" in Cuba, at "*Guyman's*," and in the river at "*Mayan.*"

It appears to me to be allied to *C. Humboldtii* A. Br., but the nucleus is smaller, so that according to Braun's synopsis, it is allied rather with *C. Ceylonica* Klein.

In Plate 189, Figs. 1 and 2 represent the stem with spines of variable length, the leaves with long, naked, basal segments, one leaf with three additional nodes (one node fertile, continued in fig. 3), a portion of a naked leaf, × 25; fig. 4, nucleus × 50.

CHARA CARMENENSIS sp. nov.

Chara diplostephana, triplosticha, gymopus, monoica-conjuncta, podophora; foliola posteriora breviora, anteriora sporangio æqualia vel paullo longiora, articuli foliorum 9; articulus infimus diametro 4-plo longior; nucleus minor 0.610 mm. longa; caulis circa 25 cm. longus, flexilis, aculeis linearis acuminatis armatus; aculeis ½–1 diametro caulis; stipulæ lineares ½–⅔ articulo infimo longæ.

This species, collected by Dr. A. E. Palmer on Carmen Island, in the Gulf of California, is a slender, long-leaved form, with numerous, scattered, narrowly linear spines rarely longer than half the diameter of the stem; verticils of 8 to 10 leaves, the segments of the leaves usually 9, the lowest naked, then 7 corticated, then a short, rather abruptly pointed tip. The lowest naked segment is about 1.7 mm. long and 0.440 in diameter; the stipules, though long and slender, cover but little more than half this node. The bracts are developed around the leaf nodes, but the posterior are quite short, while the anterior equal or a little exceed the length of the sporophydium. The coronula of the sporophydium is slightly spreading, not connivent; the nucleus is 0.610 mm. long by 0.360 broad, with *twelve* prominent ridges.

This species seems most nearly related to *Ch. Ceylonica* Klein and Willd. (*Ch. gymnopus* var. *Delilei* A. Br.), and *Ch. Angolensis* A. Br., from Ceylon and Africa, and to *Ch. armata* Meyen, from Sandwich Islands; from all of which it is clearly distinguished either by the spinescence of the stem, size of nucleus and by other characters.

In Plate 190, Fig. 1 represents the plant about natural size, figs. 2 and 3 portions of the stem and leaves × 25, fig. 4 nucleus × 50.

CHARA INCONSTANS var. HICKSIANA var. nov. (*Chara Hicksii* Allen in plate 191.)

Chara diplostephana, triplosticha, gymnopus, monoica-conjuncta, podophora; foliola anteriora sporangio breviora, posteriora brevissima; articuli foliorum 4–5; articulus infimus diametro 4–5-plo longior; nucleus 0.650 mm. longa.

This small *Chara* was collected by Mr. Hicks, of the University of Michigan, in one of the lakes of that State; the plant is inconspicuous, only about 4 cm. high, in dense tufts. The stem is remarkable for its very irregular and incompletely developed cortex, the cells of which are short and numerous; the intermediate (secondary) tubes are often suppressed wholly or in part, their places filled by the spreading cells of the adjacent series; the spines are very short and pointed (almost conical). The stipules are well developed but short, as compared with the lowest nodes of the leaves, upper row .425 mm. long; lower row .250 mm. long. Leaves about 10, consisting of only 4 or 5 segments, including the tip, which may be 2-celled The lowest naked node is often very long, as shown in Fig. 5, but usually about 5 times as long as its diameter, (1.5 mm. long, 0.365 mm. in diameter. The lowest node is usually fertile. Bracts, anterior about two-thirds the length of the sporophydium, posterior very short. Coronula short, of somewhat diverging cells; nucleus about 0.650 long by 0.360 broad, with 12–13 striæ. Antheridium 0.315 mm, in diameter.

This species seems to be referable to *Ch. inconstans* A. Br., but to differ from the two forms, both belonging to the West Indies, *C. Œrstediana* and *C. Cruegeriana*, by the large nucleus, as well as the characters of the stem and leaves ; the irregular cortex of the present gathering may not prove to be constant in this variety.

In Plate 191, fig. 1, plant natural size ; figs. 2–5 × 25 ; fig. 7 nucleus × 50.

NEW SPECIES OF NITELLA.

The species now to be described supplement the first fascicle of the second (systematic) part of my Characeæ of America, recently issued.

NITELLA MEXICANA sp. nov.

Nitella monarthrodactyla, furcata, homœophylla, monoica, gymnocarpa, apiculata; group of *N. flexilis* Ag.

Stem large, .730 to 1.098 in diameter, verticils of 8 leaves; leaves about .585 in diameter, once divided; terminals 2–3, about .365 in diameter; sporophydia aggregated (usually) 1–3 in number at node of leaf; nucleus .275 long, .230 broad, with 5 prominent striæ; membrane of the spore very minutely granular. Antheredium .245 in diameter.

This robust species, collected by Mr. Pringle in slow-flowing streams in Mexico, appears at first sight to belong to *N. flexilis* Ag., to which it is clearly allied; it differs, however, by its much smaller spore and antheridium (in *flexilis* the spore is .450 long), the membrane of which is granular (instead of smooth as in *flexilis*).

Plate 186, fig. 1, nat. size, figs. 2, 3 and 4 × 25, fig. 5 × 50.

NITELLA CALIFORNICA sp. nov.

Nitella monarthrodactyla, furcata, homœophylla, gymnocarpa, monoica, apiculata.

Plant of medium size, aspect of ordinary *N. flexilis;* leaves once divided, terminal divisions one-celled, abruptly pointed, terminals of sterile leaves elongated, of fertile leaves shorter, often incurved; sporophydia aggregated, usually 2 at a node, coronula evanescent; spore (nucleus) .500 to .535 long, .450 to .530 broad, with 6 or 7 prominent striæ; membrane of spore granular. Antheridium .285 in diameter.

This species has been collected in different places in California, in two forms: 1, the ordinary, diffuse form; and 2, forma *nidifica*, closely resembling a species of *Tolypella*, in the compactness of the fertile verticils. It differs clearly from *N. flexilis* Ag., which it closely resembles and to which it is most nearly related by the size of the nucleus and particularly in the granular membrane of the spore. These markings on the spore differ also from those of *N. Mexicana* Allen, by being much coarser; the spores are also larger than *Mexicana*.

The ordinary form collected by Mr. J. W. Blankinship, in Lake county.

The forma *nidifica*, collected by the same gentleman in Humboldt county, June 12, 1893.

Plate 185, fig. 1, nat. size, fig. 2 × 25, fig. 3 × 50.

NITELLA OCCIDENTALIS sp. nov.

Nitella monarthrodactyla, furcata, homœophylla, gymnocarpa, dioica, acuminata, sporophydia aggregata.

Plants small, 8–10 cm. in height, delicate, .535 in diameter; leaves 6, .440 in diameter, once divided, terminals acuminate, .170 in diameter at base; sporophydia 2–3 at the fork of the leaves; nucleus .390 long by .320 broad (variations .345, .360 and .390 long by .320, .340 and .365 broad), with 6 ridges not prominent; membrane roughened with elevations, ridges and depressions. Antheridium about .800 in diameter.

This plant differs from *N. montana* Allen, in the smaller nucleus, which is differently sculptured and the larger antheridia.

The whole plant is also rather larger than *N. montana.* From *N. Blankinshipii* Allen, it differs in the smaller nucleus, which is differently sculptured and by the larger antheridia. The general size and appearance of the plant resembless *N. Blankinshipii;* in that plant, however, the oogonia are single, aggregated in *occidentalis.*

Collected by Mr. Blankinship, in California, Lake county, June, 1893.

Plate 187, figs. 1 and 2, male and female plants, natural size (male plants more diffuse; female terminals longer); figs. 3 and 4 × 25, fig. 5, nucleus × 50.

Plate 188. To illustrate the description of *N. Japonica* Allen, BULLETIN, vol. **20**, page 120. Fig. 1, plant natural size; figs. 2, 3, 4 and 5 × 25; fig. 6, coronula of sporophydium, showing the elongated terminal cells, separated × 50; fig. 7 nucleus × 50; fig. 8 surface of same, covered with minute conical spines highly magnified.

CHARA DEPAUPERATA sp. nov.

Chara diplostephana, triplosticha, gymnopus, monoica—conjuncta, podosteira.

Plant small, condensed, but about half a cm. in height; stems armed with numerous spines, which are about as long as the diameter of the stem; stipules large, comparatively longer than the basal node of the leaf; leaves of 5 to 7 nodes, lowest segment naked, .480 long, .315 broad, second segment corticated, .610 long, .290 broad, the remaining segments successively shorter and smaller; the terminal, naked tip short and conical; the whole leaf about 2.4mm. long, the lowest node sterile; bracts verticillate, the anterior bracts somewhat longer than the sporophydium, the posterior but little shorter; sporophydium large, coronula spreading, short; nucleus (spore), very large for the size of the plant, .660 long, .650 broad (.635 × .440), with eleven or twelve ridges, not prominent.

This species, collected near Nassau, N. P. (West Indies), by the late Dr. Northrop, seems to be allied to *Ch. Ceylonica* Willd. But one collection of a very few specimens was made. Plate 192.